

Serial No.: 09/625,710  
Filed: July 25, 2000

#### AMENDMENTS TO THE CLAIMS

1-7. (Cancelled)

8. (Previously Amended) A system for the partial oxidation of light hydrocarbons and the partial oxidation of  $H_2S$ , comprising: a hydrocarbon injection line, an  $H_2S$  injection line in communication with said hydrocarbon injection line, an oxygen injection line in communication with said hydrocarbon injection line, a reaction zone receiving gases from said hydrocarbon,  $H_2S$  and oxygen injection lines and including a catalyst suitable for catalyzing the partial oxidation of said hydrocarbon and the partial oxidation of  $H_2S$  to form a product comprising  $CO$ ,  $H_2$ , elemental sulfur and  $H_2O$ , and, downstream from said reaction zone, at least one cooling zone including a sulfur condenser for removing elemental sulfur from said product.

9. (Previously Amended) The system according to claim 8 comprising a mixing zone upstream of said reaction zone, said mixing zone adapted for receiving said hydrocarbon,  $H_2S$ , and oxygen gases.

10. (Original) The system according to claim 9 comprising a thermal barrier between said mixing zone and said reaction zone.

11. (Original) The system according to claim 9 wherein said oxygen injection line communicates with said reaction zone.

12. (Original) The system according to claim 9 wherein said mixing zone receives oxygen from said oxygen injection line.

13-14. (Cancelled)

15. (Previously Amended) The system according to claim 8 comprising at least one tailgas processing unit downstream of said sulfur condenser.

16. (Original) The system according to claim 8 wherein said catalyst is supported on a wire gauze.

**Serial No.:** 09/625,710  
**Filed:** July 25, 2000

17. (Previously Amended) The system according to claim 8 wherein the catalyst is selected from the group consisting of: platinum, rhodium, iridium, nickel, palladium, iron, cobalt, rhenium, rubidium, Pd-La<sub>2</sub>O<sub>3</sub>, Pt/ZrO<sub>2</sub>, Pt/Al<sub>2</sub>O<sub>3</sub> and combinations thereof.

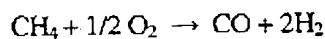
18-20. (Cancelled)

21. (Previously Added) The system of claim 8 comprising, in sequence:

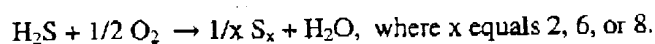
a synthesis gas reactor having a light hydrocarbon gas inlet, an O<sub>2</sub> inlet and an H<sub>2</sub>S inlet,  
a firetube boiler,  
a sulfur condenser,  
a heater, and  
a tailgas cleanup unit.

22. (Previously Added) The system of claim 21 further comprising, in sequence, a cooler for receiving product gas from said tailgas cleanup unit, and a quench tower.

23. (Currently Amended) The system of claim 17 wherein said catalyst is ~~active for~~ capable of catalyzing the reactions



and



24. (Cancelled)

25. (Previously Added) The system of claim 15 wherein said tailgas processing unit comprises a sulfur absorbing material.

**Serial No.:** 09/625,710  
**Filed:** July 25, 2000

26. (Previously Added) An apparatus for producing synthesis gas and elemental sulfur, the apparatus comprising:

means for effecting both the catalytic partial oxidation of a light hydrocarbon to form CO and H<sub>2</sub> products and the catalytic partial oxidation of H<sub>2</sub>S to elemental sulfur and H<sub>2</sub>O in a single reaction zone of a short contact time reactor, whereby a stream of product containing CO, H<sub>2</sub>, H<sub>2</sub>O and elemental sulfur is produced;

means for maintaining the temperature of said reaction zone above the dew point of sulfur,

means for cooling said product stream below the dewpoint of sulfur;

means for recovering condensed elemental sulfur from said cooling means; and

means for recovering a stream of desulfurized synthesis gas.

27. (Previously Added) The apparatus of claim 26 comprising means for removing residual elemental sulfur from said desulfurized synthesis gas stream.

28. (Previously Amended) The apparatus of claim 26 wherein said means for maintaining the temperature of said reaction zone above the dew point of sulfur comprises means for maintaining the temperature of said reaction zone above 500 degrees C.